ABSTRACT OF THE DISCLOSURE

A light-emitting semiconductor device (10) consecutively includes a sapphire substrate (1), an AlN buffer layer (2), a silicon (Si) doped GaN $n^{+}$-layer (3) of high carrier (n-type) concentration, a Si-doped $(Al_{x3}Ga_{1-x3})_{y3}In_{1-y3}N$ $n^{+}$-layer (4) of high carrier (n-type) concentration, a zinc (Zn) and Si-doped $(Al_{x2}Ga_{1-x2})_{y2}In_{1-y2}N$ emission layer (5), and a Mg-doped $(Al_{x1}Ga_{1-x1})_{y1}In_{1-y1}N$ p-layer (6). The AlN layer (2) has a 500 Å thickness. The GaN $n^{+}$-layer (3) has about a 2.0 μm thickness and a $2 \times 10^{18}/cm^3$ electron concentration. The $n^{+}$-layer (4) has about a 2.0 μm thickness and a $2 \times 10^{18}/cm^3$ electron concentration. The emission layer (5) has about a 0.5 μm thickness. The p-layer 6 has about a 1.0 μm thickness and a $2 \times 10^{17}/cm^3$ hole concentration. Nickel electrodes (7, 8) are connected to the p-layer (6) and $n^{+}$-layer (4), respectively. A groove (9) electrically insulates the electrodes (7, 8). The composition ratio of Al, Ga, and In in each of the layers (4, 5, 6) is selected to meet the lattice constant of GaN in the $n^{+}$-layer (3). The LED (10) is designed to improve luminous intensity and to obtain purer blue color.